

**To:** Firestone, Michael[Firestone.Michael@epa.gov]; McQueen, Jacqueline[McQueen.Jacqueline@epa.gov]  
**Cc:** 'Darren Gill'[Darren.Gill@fieldturftarkett.com]  
**From:** Walt Sanders  
**Sent:** Fri 10/24/2014 7:50:03 PM  
**Subject:** RE: New Time Proposed: Tire Crumb Safety  
[Artificial Turf Safety - The Research and Facts \(EPA\).pptx](#)  
[Field Turf Safety Proven With Science OCT172014-SP.pdf](#)

Michael and Jackie,

Attached is the PowerPoint presentation and Fact Sheet in advance of our presentation on October 28.

Would it be possible to download the presentation to your projection system at EPA?

If not, we can bring a flash drive with the presentation.

If you could send us a list of meeting participants early next week, it would be very helpful.

Thanks again for taking the time to listen to your presentation.

Walt A. Sanders


Vice President Law & Government Affairs

Van Fleet Associates, Inc.

1800 Diagonal Road, Suite 600

Alexandria, VA 22314

(703)647-7504 (O)

  
(703)647-7531(fax)

**From:** Firestone, Michael [mailto:Firestone.Michael@epa.gov]  
**Sent:** Wednesday, October 15, 2014 5:30 PM  
**To:** Walt Sanders  
**Subject:** Re: New Time Proposed: Tire Crumb Safety

Walt

The timing is fine.

Michael P. Firestone, Ph.D.  
Regulatory Support & Science Policy Division  
Office of Children's Health Protection (MC 1107T)  
Office of the Administrator  
U.S. Environmental Protection Agency  
Room 1130 EPA West Building  
Washington, DC 20460  
Office: 202-564-2199  
[REDACTED]

FAX: 202-564-2733

**From:** Walt Sanders  
**Sent:** Wednesday, October 15, 2014 5:25 PM  
**To:** Firestone, Michael  
**Cc:** 'Darren Gill'  
**Subject:** RE: New Time Proposed: Tire Crumb Safety

Michael,

Field Turf is putting a factual and science based presentation together and will probably get a

PPT presentation to you sometime next week, if that is soon enough.

Please let us know if you need something sooner.

Walt

**From:** Firestone, Michael [<mailto:Firestone.Michael@epa.gov>]  
**Sent:** Wednesday, October 15, 2014 5:16 PM  
**To:** Walt Sanders  
**Subject:** RE: New Time Proposed: Tire Crumb Safety

Walt

Please forward to me any presentation or other background material you would like participants to see so that I can attach them to the meeting invitation – especially for those calling in.

Thanks.

Michael P. Firestone, Ph.D.

Regulatory Support & Science Policy Division

Office of Children's Health Protection (MC 1107T)

Office of the Administrator

U.S. Environmental Protection Agency

Room 1130 EPA West Building

Washington, DC 20460

Office: 202-564-2199



FAX: 202-564-2733

**From:** Walt Sanders [<mailto:wsanders@vmgthehill.com>]  
**Sent:** Wednesday, October 15, 2014 5:00 PM  
**To:** Firestone, Michael  
**Subject:** RE: New Time Proposed: Tire Crumb Safety

Yes. Thanks.

**From:** Firestone, Michael [<mailto:Firestone.Michael@epa.gov>]  
**Sent:** Wednesday, October 15, 2014 4:57 PM  
**To:** Walt Sanders  
**Subject:** RE: New Time Proposed: Tire Crumb Safety

Walt – did the re-send work?

Michael P. Firestone, Ph.D.

Regulatory Support & Science Policy Division

Office of Children's Health Protection (MC 1107T)


Office of the Administrator

U.S. Environmental Protection Agency

Room 1130 EPA West Building

Washington, DC 20460

Office: 202-564-2199



FAX: 202-564-2733

**From:** Walt Sanders [<mailto:wsanders@vmgthehill.com>]  
**Sent:** Wednesday, October 15, 2014 4:56 PM

**To:** Firestone, Michael  
**Subject:** RE: New Time Proposed: Tire Crumb Safety

Sorry for the confusion. Please keep the original date. Please resend your meeting request and I will confirm. I am dealing with too many meetings.

**From:** Firestone, Michael [<mailto:Firestone.Michael@epa.gov>]  
**Sent:** Wednesday, October 15, 2014 4:49 PM  
**To:** Walt Sanders  
**Subject:** RE: New Time Proposed: Tire Crumb Safety

Walt

Our office is hosting an internal EPA-wide children's health summit toward the end of the week which is why I wanted to meet on Mon or Tue.

If you can only make it the ned of the week, perhaps you could meet with the other reps and I can check in with them later on.

Michael P. Firestone, Ph.D.

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FAX: 202-564-2733

-----Original Appointment-----

**From:** Walt Sanders [<mailto:wsanders@vmgthehill.com>]

**Sent:** Wednesday, October 15, 2014 4:48 PM

**To:** Firestone, Michael

**Subject:** New Time Proposed: Tire Crumb Safety

**When:** Tuesday, October 28, 2014 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** EPA West Building, Room 1144C (down the hall from the Constitution Ave entrance near 14th Street)

Michael,

Got a note from you that you set up the meeting on Tuesday October 28. Since we had requested a meeting on October 30, Mr. Ahern and Mr. Trout had booked their airline reservations to arrive on Wednesday, October 29 for a meeting on Thursday October 30. Would it be possible to move the meeting to any time during the day on Thursday?

Please let us know.

Walt A. Sanders

Vice President Law & Government Affairs

Van Fleet Associates, Inc.

1800 Diagonal Road, Suite 600

Alexandria, VA 22314

(703)647-7504 (O)

  
(703)647-7531(fax)

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New Meeting Time Proposed:

Tuesday, October 28, 2014 2:00 PM-3:00 PM (UTC-05:00) Eastern Time (US & Canada).



# **Presentation to**

**U.S. Environmental Protection Agency  
Washington, DC**

## **Artificial Turf Safety, Research and Facts**

**Darren Gill, Vice-President – Marketing,  
Innovation, Customer Service  
FieldTurf**

**October 28, 2014**

Artificial Turf Safety

# OVERVIEW

- **The speculation that artificial turf is linked to cancer is not a new issue** – it was first raised more than six years ago, and once the science was done to show there was no link, it receded.

- Scientific research from academic, federal and state government organizations has **unequivocally failed to find any link between synthetic turf and cancer** – as acknowledged by NBC and other news organizations in their reporting.

- Over the past two decades, there have been more than **60 technical studies and reports** that review the health effects of crumb rubber pertaining to a host of circumstances or conditions – including cancer.
- It's important to keep in mind what the conclusion from the NBC report was – **a list is not a link, and more research is needed.** They were very clear about this.

- **FieldTurf is committed** as a company and as an industry to the safety of our fields and the athletes that compete on them.
- This is why we have encouraged the rigorous work from third-parties that has taken place over decades to confirm there are **no negative health effects** connected to synthetic turf, and Field Turf is willing to participate in any new research or studies that would add to the public knowledge.

Artificial Turf Safety

# THE SCIENCE

*“The SVOCs identified based on library matches of their mass spectra were not present in toxicological databases evaluated and many are ubiquitous part of consumer products. Similarly, the metal concentrations measured in field samples indicate that the risk would be de minimus among all populations expected to use artificial turf fields”*

BIOACCESSIBILITY AND RISK EXPOSURE TO METALS AND SVOC'S IN  
ARTIFICIAL TURF FIELD FILL MATERIALS AND FIBERS (2013)

Brian T. Pavilonis, Clifford P. Weisel, Brian Buckley, and Paul J. Lioy

*“The majority of the studies have been on higher surface area particles and have concluded they are currently acceptable. Therefore the larger granules used in artificial turf will have even less potential for emissions. For example a study undertaken by the Danish Ministry of the Environment concluded that the health risk on children’s playgrounds that contained both worn tyres and granulate rubber was insignificant. The available body of research does not substantiate the assumption that cancer resulting from exposure to SBR granulate infills in artificial turf could potentially occur.”*

AN OPEN LETTER CONCERNING THE POTENTIAL CANCER RISK FROM  
CERTAIN GRANULATE INFILLS FROM ARTIFICIAL TURF (JULY 2006)

FIFA, Prof. Dr. Jiri Dvorak

*“The uptake of PAH of football players active on artificial grass fields with rubber crumb infill is minimal. If there is any exposure, then the uptake is very limited and within the range of uptake of PAH from environmental sources and/or diet.”*

HYDROXYPYRENE IN URINE OF FOOTBALL PLAYERS AFTER PLAYING ON  
ARTIFICIAL SPORTS FIELD WITH TIRE CRUMB INFILL (DECEMBER 2008)

Joost G. M. van Rooij, Frans J. Jongeneelen

*“An analysis of the concentration of metals in the actual drainage water indicates that metals do not leach in amounts that would be considered a risk to aquatic life as compared to existing water quality standards. Analysis of the laboratory based leaching potential of metals in accordance with acceptable EPA methods indicates that metals will leach from the crumb rubber but in concentrations that are within ranges that could be expected to leach from native soil.”*

EVALUATION OF THE ENVIRONMENTAL EFFECTS OF SYNTHETIC TURF  
ATHLETIC FIELDS (DECEMBER 2008)

Milone & MacBroom

*“Genotoxicity testing of tire crumb samples following solvent extraction concluded that no DNA or chromosome-damaging chemicals were present. This suggests that ingestion of small amounts of tire crumb by small children will not result in an unacceptable hazard of contracting cancer.”*

TOXICOLOGICAL EVALUATION FOR THE HAZARD ASSESSMENT OF TIRE  
CRUMB FOR USE IN PUBLIC PLAYGROUNDS (JULY 2003)  
Enviro-Test Laboratories, Alberta Centre for Injury Control and Research, Department of Public  
Health Sciences

*“...risk is well below the de minimis level of  $1 \times 10^{-6}$  (one in one million), generally considered an acceptable cancer risk due to its small magnitude compared to the overall cancer rate”*

EVALUATION OF HEALTH EFFECTS OF RECYCLED WASTE TIRES IN  
PLAYGROUND AND TRACK PRODUCTS (JANUARY 2007)

Office of Environmental Health Hazard Assessment / California Integrated Waste Management  
Board

*“Based upon these findings, the use of outdoor and indoor artificial turf fields is not associated with elevated health risks.”*

HUMAN HEALTH RISK ASSESSMENT OF ARTIFICIAL TURF FIELDS BASED UPON  
RESULTS FROM FIVE FIELDS IN CONNECTICUT (JULY 2010)

Connecticut Department of Public Health Program in Environmental and Occupational Health  
Assessment

*“Eleven different risk assessments applied various available concentrations of COPCs and none identified an increased risk for human health effects as a result of ingestion, dermal or inhalation exposure to crumb rubber.”*

A REVIEW OF THE POTENTIAL HEALTH AND SAFETY RISKS FROM SYNTHETIC  
TURF FIELDS CONTAINING CRUMB RUBBER INFILL (MAY 2008)  
New York City Department of Health and Mental Hygiene

*“Levels of chemicals in the air at synthetic turf fields do not raise a significant health concern.” - “There is no significant threat from chemicals leaching into surface water and groundwater. While some chemicals can be released from crumb rubber over time, they are in small concentrations and are reduced by absorption, degradation and dilution - resulting in no significant impact on groundwater or surface water.”*

AN ASSESSMENT OF CHEMICAL LEACHING, RELEASES TO AIR AND  
TEMPERATURE AT CRUMB-RUBBER INFILLED SYNTHETIC FIELDS (MAY 2009)  
New York State Department of Environmental Conservation & New York State Department of  
Health

*“The uptake of PAH by athletes who have contact with crumb rubber synthetic turf is negligible. As far as dermal contact is concerned, the Norwegian Institute of Public Health and Radium Hospital (2006) carried out an extensive analysis of possible health concerns. The study found that there was no evidence to suggest that allergic reactions were caused by exposure to crumb rubber and speculated that latex in car tires was either - less available for uptake or was - deactivated as an allergen.”*

REVIEW OF THE IMPACTS OF CRUMB RUBBER IN ARTIFICIAL TURF  
APPLICATIONS (FEBRUARY 2010)

University of California, Berkeley and the Corporation for Manufacturing Excellence (Manex)

*“In summary, an analysis of the air in the breathing zones of children above synthetic turf fields do not show appreciable impacts from COPCs [Contaminants of Potential Concern] contained in the crumb rubber. Therefore, a risk assessment was not warranted from the inhalation route of exposure.”*

AIR QUALITY SURVEY OF SYNTHETIC TURF FIELDS CONTAINING CRUMB  
RUBBER INFILL (MARCH 2009)

New York City Department of Health and Mental Hygiene

Artificial Turf Safety

# CONCLUSION

- Scientific research from academic, federal and state government organizations has **unequivocally failed to find any link between synthetic turf and cancer.**
- There can always be more research done, and we are willing to support any additional scientific studies in any way we can, but **we are 100 percent confident in what all the available data tells us** – that anyone using our products should rest assured there are no valid health concerns tied to artificial turf.

# Contact Information

Darren Gill

Vice-President – Marketing,  
Innovation, Customer Service

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CANADA

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[www.fieldturf.com](http://www.fieldturf.com)

# Synthetic Turf Safety Proven With Science



THE ULTIMATE  
SURFACE EXPERIENCE



# Synthetic Turf Safety Proven With Science

## The Mother of Invention

The motivation for the invention of FieldTurf was twofold – improve the health and safety of players; and protect the planet.

When FieldTurf was just an idea, athletes were being beat up playing on the dangerous carpet surfaces of that era. Keeping grass fields in good condition required tons of harmful pesticides and chemicals, while irrigation wasted millions of gallons of clean water.

Health and safety was, is and always will be FieldTurf's DNA. Because we don't just make turf. We make a difference.

Over the past decade, our invention has improved player safety, reducing and preventing injuries around the globe. Our turf has eliminated millions of pounds of pesticides and harmful chemicals from the environment and saved billions of gallons of fresh water.

Recent news reports citing a possible link between crumb rubber and cancer have rightfully caused great concern to all. Unfortunately, these reports do not consider the decades of science studying exactly this subject.

Ongoing research continues the efforts to ensure that artificial playing fields reduce health and safety concerns. Not create them.

Before the acceptance of crumb rubber as an approved, safe, infill material for artificial turf, hundreds of studies had been commissioned and executed by health and safety experts worldwide.

The following pages look at some of their findings.

## CRUMB RUBBER

Crumb rubber, made from reclaimed tires, is an important part of the industry's premiere infill option for synthetic turf fields. It has been safely used in many products since being introduced in the early 1990s, and in playgrounds and tracks for much longer. The notoriously resilient SBR rubber material provides enhanced durability and cushioning to prevent injuries and keeps playing surfaces safe. Aside from its use in synthetic turf sports fields, SBR (Styrene-butadiene) rubber, referred to as crumb rubber, is also used in a variety of products from children's rubber toys to surgical gloves to food packaging, and even in chewing gum.

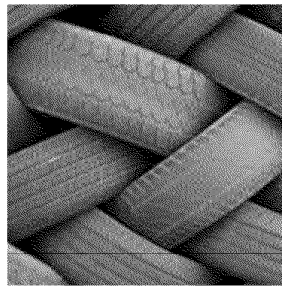
With the growing popularity of synthetic turf, questions have surfaced about the safety of the little black rubber pellets that protect our athletes. Hundreds of studies have been completed to understand any potential risks of artificial turf and its components. Government health ministries and environmental bodies in the U.S. and Europe have commissioned extensive research.

So have world health organizations, leading universities and independent scientific committees. Elected officials have reacted to the concerns of their constituents by commissioning studies to get the facts. The research has been done. The studies exist.

Read what the experts have said in independent testing, studies and reports on the potential health and environmental impact of artificial turf.



'crumb rubber is also used in a variety of products from children's toys to surgical gloves to food packaging, even chewing gum'



## Ingestion/ Inhalation

"The SVOCs identified based on library matches of their mass spectra were not present in toxicological databases evaluated and many are ubiquitous parts of consumer products. Similarly, the metal concentrations measured in field samples indicate that the risk would be de minimis among all populations expected to use artificial turf fields"

*Brian T. Pavilonis, Clifford P. Weisel, Brian Buckley, and Paul J. Lioy.,  
"Bioaccessibility and Risk Exposure to Metals and SVOCs in Artificial Turf Field  
Fill Materials and Fibers (2013)"*

"The uptake of PAH of football players active on artificial grass fields with rubber crumb infill is minimal. If there is any exposure, then the uptake is very limited and within the range of uptake of PAH from environmental sources and/or diet."

*Joost G. M. van Rooij, Frans J. Jongeneelen, "Hydroxypyrene in urine of  
football players after playing on artificial sports field with tire crumb infill  
(December 2008)"*

"Genotoxicity testing of tire crumb samples following solvent extraction concluded that no DNA or chromosome-damaging chemicals were present. This suggests that ingestion of small amounts of tire crumb by small children will not result in an unacceptable hazard of contracting cancer."

*Enviro-Test Laboratories, Alberta Centre for Injury Control and Research,  
Department of Public Health Sciences, July 2003, 'Toxicological Evaluation for  
the Hazard Assessment of Tire Crumb for Use in Public Playgrounds'*

"Based upon the current evidence, a public health risk appears unlikely. A variety of governmental bodies including Norway, Sweden, New Jersey and California have recently reviewed the health issues; their assessments have not found a public health threat. Sources of exposure unrelated to artificial turf fields are likely more important than the turf fields for many chemicals."

*Connecticut Department of Public Health, October 2007, 'Artificial Turf Fields:  
Health Questions'*

"Based on the minimal concentrations of chemicals detected, it is considered very unlikely that any significant adverse vapor (inhalation) exposures would occur to humans in close proximity to where crumb rubber is used in outdoor applications."

*New Jersey Department of Environmental Protection, Division of Science,  
Research, and Technology, June 2007, 'Environmental Assessment and Risk  
Analysis - Preliminary Assessment of the Toxicity from Exposure to Crumb  
Rubber: its use in Playgrounds and Artificial Turf Playing Fields'*

'sources of exposure  
unrelated to artificial  
turf fields are likely  
more important than  
the turf fields'

## DERMa I Con ta Ct

"Tire crumb does not contain chemicals with high vapour pressures, exposure via inhalation deemed low risk. Oral ingestion deemed low risk because ingestion not likely, furthermore, question of how effective stomach acids and enzymes are at extracting toxic chemicals from tire crumb and transporting them into the blood stream."

*D.A. Birkholz, Director, Research & Development, ALS Laboratory Group, Edmonton, Alberta, October 2006, 'Assessing the Health and Environmental Impact from the Use of End-of-Life Tire Rubber Crumb as Artificial Turf in Sports Arenas'*

"Based on the available literature on exposure to rubber crumb by swallowing, inhalation and skin contact and our experimental investigations on skin contact we conclude that there is not a significant health risk due to the presence of rubber infill from used car tyres."

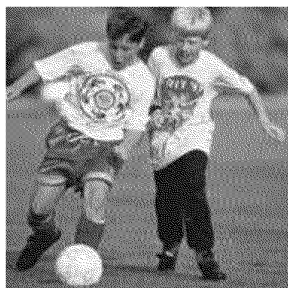
*INTRON, commissioned by two tyre associations, and supervised by the National Institute for Public Health and the Environment and by the Ministry of Housing, Spatial Planning and the Environment in the Netherlands, April 2008, 'Follow-up study of the environmental aspects of rubber infill'*

"Dermal exposure deemed low risk because carrier solvent is needed to extract toxic chemicals from tire crumb and to penetrate protective skin layers"

*D.A. Birkholz, Director, Research & Development, ALS Laboratory Group, Edmonton, Alberta, October 2006, 'Assessing the Health and Environmental Impact from the Use of End-of-Life Tire Rubber Crumb as Artificial Turf in Sports Arenas'*

"The uptake of PAH by athletes who have contact with crumb rubber synthetic turf is negligible. As far as dermal contact is concerned, the Norwegian Institute of Public Health and Radium Hospital (2006) carried out an extensive analysis of possible health concerns. The study found that there was no evidence to suggest that allergic reactions were caused by exposure to crumb rubber and speculated that latex in car tires was either - less available for uptake or was - deactivated as an allergen."

*University of California, Berkeley and the Corporation for Manufacturing Excellence (Manex), February 2010, 'Review of the Impacts of Crumb Rubber in Artificial Turf Applications'*



'there is  
not a significant  
health risk due to  
the presence of  
rubber infill'

## aiRQaIItY

“Levels of chemicals in the air at synthetic turf fields do not raise a significant health concern. “

*New York State Department of Environmental Conservation & New York State Department of Health, May 2009, 'An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Fields'*

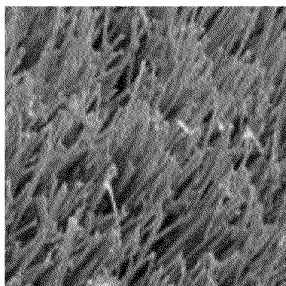
“Twenty air samples were collected above and around two synthetic turf playing surfaces in Connecticut. Ten of the samples were analyzed for volatile nitrosamine content and 10 were analyzed for benzothiazole and 4-(tert-octyl) phenol content. The samples were collected on warm, late summer days during periods of light to calm winds. In one case, the synthetic turf surface had been groomed three days prior to the sampling. The sampling was conducted during periods when the temperature of the crumb rubber in-fill material was elevated due to exposure to the sun. The combination of air temperatures, surface temperatures, wind speed and, the recent maintenance of one of the fields, are believed to be conditions favorable for generating maximum concentrations of the analytes in the air column above and around the playing surfaces. This study determined that under favorable conditions for vapor generation, no detectable concentrations of volatile nitrosamines or 4-(tert-octyl) phenol existed in the air column at a height of four feet above the tested synthetic playing surfaces or in the air either upwind or downwind of the fields.”

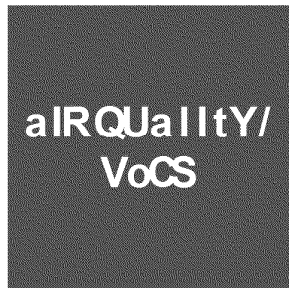
*Milone & MacBroom, engineering, landscape architecture, and environmental science firm based in Connecticut, December 2008, 'Evaluation of the Environmental Effects of Synthetic Turf Athletic Fields'*

‘larger granules used in artificial turf will have even less potential for emissions.’

“The majority of the studies have been on higher surface area particles and have concluded they are currently acceptable. Therefore the larger granules used in artificial turf will have even less potential for emissions. For example a study undertaken by the Danish Ministry of the Environment concluded that the health risk on children's playgrounds that contained both worn tyres and granulate rubber was insignificant. The available body of research does not substantiate the assumption that cancer resulting from exposure to SBR granulate infills in artificial turf could potentially occur.”

*Prof. Dr. Jiri Dvorak, FIFA, July 2006, 'An Open Letter concerning the potential cancer risk from certain granulate infills from artificial turf'*



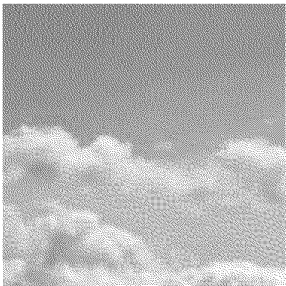


“It is unlikely that any losses could occur to air or water in concentrations that would pose serious human or environmental risk. This opinion is supported by the reports and academic studies reviewed, which have shown insignificant environmental effects of such chemicals or release of volatiles and particulates into the atmosphere.”

*British Standards Institute (BSI), the Sports and Play Construction Association (SAFCA), March 2007, ‘Twenty Questions [and Answers] on Rubber Granulate’*

“The results of the INERIS Health Risk Evaluation, based on the concentration of the substances and worst-case scenarios, indicate that the VOC and aldehyde emissions from the three types of artificial grass fields studied in small and poorly ventilated indoor gymnasium situations are of no cause for concern for human health, for the workers installing the surfaces as well as for the general public, professional or amateur athletes, adults and children. In conclusion to its study, the INERIS stipulates that the health risks associated with the inhalation of VOC and aldehydes emitted by artificial grass fields in outdoor situations give no cause for concern towards human health.”

*Aliapur & Ademe (Environmental French Agency), 2007, ‘Environmental and Health Evaluation of the Use of Elastomer Granulates (Virgin and from Used Tyres) as Filling in Third-Generation Artificial Turf’*



‘indoor  
gymnasium situations  
are of no cause for  
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health’

## Water Quality

"The artificial (FieldTurf) field at Tabor Academy does not pose a threat to water quality or aquatic life. Water samples taken from the field in 2013 were tested for arsenic, cadmium, chromium, lead, mercury and zinc."

*Camp, Dresser, McKee and Smith, Inc, "Tabor Academy – Synthetic Turf Athletic Field Evaluation (March 2014)"*

"There is no significant threat from chemicals leaching into surface water and groundwater. While some chemicals can be released from crumb rubber over time, they are in small concentrations and are reduced by absorption, degradation and dilution - resulting in no significant impact on groundwater or surface water."

*New York State Department of Environmental Conservation & New York State Department of Health, May 2009, 'An Assessment of Chemical Leaching, Releases to Air and Temperature at Crumb-Rubber Infilled Synthetic Fields'*

"The evaluation of the stormwater drainage quality from synthetic turf athletic fields included the collection and analysis of eight water samples over a period of approximately one year from three different fields, the collection and analysis of samples of crumb rubber in-fill from the same three fields plus a sample of raw crumb rubber obtained from the manufacturer, and the evaluation of the effect of the stone base material on the pH of the drainage water. The results of the study indicate that the actual stormwater drainage from the fields allows for the complete survival of the test species called *Daphnia pulex*. An analysis of the concentration of metals in the actual drainage water indicates that metals do not leach in amounts that would be considered a risk to aquatic life as compared to existing water quality standards. Analysis of the laboratory based leaching potential of metals in accordance with acceptable EPA methods indicates that metals will leach from the crumb rubber but in concentrations that are within ranges that could be expected to leach from native soil."

*Milone & MacBroom, engineering, landscape architecture, and environmental science firm based in Connecticut, December 2008, 'Evaluation of the Environmental Effects of Synthetic Turf Athletic Fields'*

"Given that undiluted runoff is not likely and that three months is an outside estimate of the duration of toxicity, it is doubtful that tire crumb would present a significant risk of contamination in receiving surface waters or groundwater."

*Enviro-Test Laboratories, Alberta Centre for Injury Control and Research, Department of Public Health Sciences, July 2003, 'Toxicological Evaluation for the Hazard Assessment of Tire Crumb for Use in Public Playgrounds'*

"Several recent studies explored this concern in great depth and found no basis for health or environmental concern due to leaching of hazardous materials from synthetic turf installations, similar to the one at Maple Park. REAC believes that there is sufficient evidence to support the conclusion that the field design at Maple Park poses no risk to the local environment in Ridgewood."

*Ridgewood Environmental Advisory Committee (REAC) January-October 2009, 'Assessment of Environmental, Health and Human Safety Concerns Related to the Synthetic Turf Surface at Maple Park in Ridgewood, NJ'*

'no basis for health or environmental concern due to leaching of hazardous materials'

## PahS / CanCER RISK

"The SVOCs identified based on library matches of their mass spectra were not present in toxicological databases evaluated and many are ubiquitous parts of consumer products. Similarly, the metal concentrations measured in field samples indicate that the risk would be de minimis among all populations expected to use artificial turf fields"

*Brian T. Pavilonis, Clifford P. Weisel, Brian Buckley, and Paul J. Liroy.,  
"Bioaccessibility and Risk Exposure to Metals and SVOC's in Artificial Turf Field Fill  
Materials and Fibers (2013) "*

"The uptake of PAH of football players active on artificial grass fields with rubber crumb infill is minimal. If there is any exposure, then the uptake is very limited and within the range of uptake of PAH from environmental sources and/or diet."

*Joost G. M. van Rooij, Frans J. Jongeneelen, "Hydroxypyrene in urine of football players after playing on artificial sports field with tire crumb infill (December 2008) "*

"...risk is well below the de minimis level of  $1 \times 10^{-6}$  (one in one million), generally considered an acceptable cancer risk due to its small magnitude compared to the overall cancer rate"

*Office of Environmental Health Hazard Assessment / California Integrated Waste Management Board, "Evaluation of Health Effects of Recycled Waste Tires in Playground and Track Products (January 2007) "*

"Genotoxicity testing of tire crumb samples following solvent extraction concluded that no DNA or chromosome-damaging chemicals were present. This suggests that ingestion of small amounts of tire crumb by small children will not result in an unacceptable hazard of contracting cancer."

*Enviro-Test Laboratories, Alberta Centre for Injury Control and Research, Department of Public Health Sciences "Toxicological Evaluation for the Hazard Assessment of Tire Crumb for Use in Public Playgrounds (July 2003) "*



"the uptake is  
within the range of  
uptake of PAH from  
other environmental  
sources or diet"

## PahS / CanCER RISK

"The uptake of PAH by athletes who have contact with crumb rubber synthetic turf is negligible."

*University of California, Berkeley and the Corporation for Manufacturing Excellence (Manex), "Review of the Impacts of Crumb Rubber in Artificial Turf Applications (February 2010)"*

"Based upon the information reviewed on PAH exposure in humans and the results of the PAH air testing performed by J.C. Broderick & Associates, the potential for exposure to PAHs during normal use of the athletic field at Schreiber and Comsewogue appears to be minimal or insignificant."

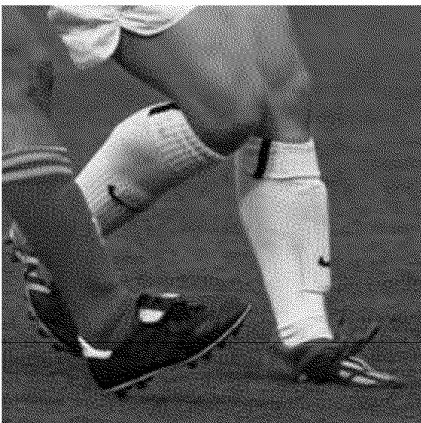
*J.C. Broderick & Associates, commissioned by Schreiber High School and Comsewogue High School (NY), October 2007, 'Ambient Air Sampling for PAHs'*

"The studies to date have concluded that PAHs (Polynuclear Aromatic Hydrocarbons) are not released or at most negligibly released from tyre abradate (The University of Dortmund Institute for Environmental Research 1997). Epidemiological studies conducted by the Health Effects Institute, The World Health Organisation and other investigators do not implicate tyre wear particles in ambient air as contributing to human health effects (respiratory and cardiovascular diseases)."

*Prof. Dr. Jiri Dvorak, FIFA, July 2006, 'An Open Letter concerning the potential cancer risk from certain granulate infills from artificial turf'*

"The majority of the studies have been on higher surface area particles and have concluded they are currently acceptable. Therefore the larger granules used in artificial turf will have even less potential for emissions. For example a study undertaken by the Danish Ministry of the Environment concluded that the health risk on children's playgrounds that contained both worn tyres and granulate rubber was insignificant. The available body of research does not substantiate the assumption that cancer resulting from exposure to SBR granulate infills in artificial turf could potentially occur."

*Prof. Dr. Jiri Dvorak, FIFA, July 2006, 'An Open Letter concerning the potential cancer risk from certain granulate infills from artificial turf'*



## MRSa/StaPh

The spread of MRSA has prompted parents and other concerned citizens to rightfully question why their children are getting sick. Recent research has proven that synthetic turf does not play a role in promoting MRSA/staph and the concerns are often brought on by companies or lobbyists with a vested interest in anti-microbial products.

**Research at Penn State confirms that Staph is not an issue on turf and that natural grass harbors more bacteria.**

<http://plantscience.psu.edu/research/centers/ssrc/research/synthetic-turf-research-penn-state>

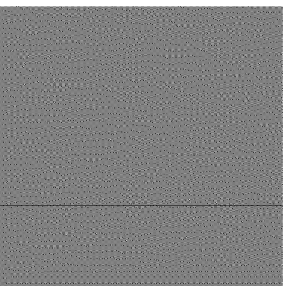
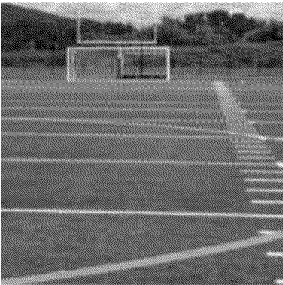
In conclusion, there are generally lower numbers of total microbes present in the infill or fibers of the synthetic turf systems tested compared to natural turfgrass rootzones and Staphylococcus aureus bacterium were not found on any of the playing surfaces. Staphylococcus aureus bacterium were found on towels and other devices used by athletes.

Under non-extreme temperature and very limited light conditions present during the indoor portion of this study, S. aureus survived on both synthetic and natural turfgrass for multiple days. However, the bacteria do not appear to thrive under these conditions as the numbers of surviving bacteria decrease significantly with time.

<http://plantscience.psu.edu/research/centers/ssrc/documents/human-health-issues-on-synthetic-turf-in-the-usa.pdf>

Based on the findings of the S. aureus survey, concern that infilled synthetic turf harbours and provides a breeding ground for S. aureus bacteria is unwarranted within the context of this study. S. aureus bacteria were found on a number of surfaces that athletes commonly come into contact with, such as towels and blocking pads; however, the tested synthetic turf did not contain any S. aureus. It is important to note that synthetic turf is more abrasive than natural turf grass and, as a result, breaks in the skin are more common, creating a pathway for infection when in contact with an infected surface.

The "Recommended Practices for the Maintenance of Infill Surfaces for NFL Games" states that "Clubs should not use antimicrobial agents on infill turf surfaces. The medical and scientific communities have not documented any benefit of using such agents on infill turf surfaces and there may be potential disbenefit to doing so."



## MRSa/StaPh

### RP 4: Anti-Bacterial Agents Recommendation recap:

The Centers for Disease Control and Prevention (CDC) does not recognize infill turf as a significant source of MRSA infections. [See Appendix E] As the CDC has stated “[t]here is a lack of evidence that large-scale use (e.g., spraying or fogging rooms or surfaces) of disinfectants will prevent MRSA infections more effectively than a more targeted approach of cleaning frequently-touched surfaces.” [See Appendix E] This RP should not be interpreted as preventing the use of cleansing agents such as detergents and soaps to clean infill turf surfaces provided that such cleaning is performed in accordance with the recommendations of the applicable turf and cleaning agent manufacturers.

### References on the Use of Anti-Bacterial Agents:

Aureden, K. and S. Garber. 2003. Methicillin-Resistant *Staphylococcus aureus* Infections Among Competitive Sports Participants --- Colorado, Indiana, Pennsylvania, and Los Angeles County, 2000– 2003. *MMWR* 52(33);793-795. <http://www.apic.org/AM/Template.cfm?Section=Reports1&Template=/CM/ContentDisplay.cfm&ContentFileID=4262>

Begier et al. 2004. A High-Morbidity Outbreak of Methicillin-Resistant *Staphylococcus aureus* among Players on a College Football Team, Facilitated by Cosmetic Body Shaving and Turf Burns. *Clin Inf Dis*;39:1446–53.

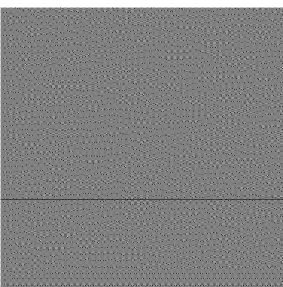
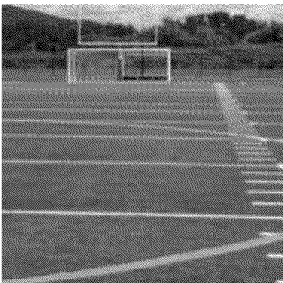
Kazakova et al. 2005. A Clone of Methicillin-Resistant *Staphylococcus aureus* among Professional Football Players. *N Engl J Med*;352:468–75.

McNitt, A.S. 2005. Synthetic turf in the USA - Trends and issues. *Int. Turfgrass Soc. Res. J.* 10:27-33.

McNitt, A.S., D.M. Petrunak, and T.J. Serensits. 2008. A Survey for the Presence of *Staphylococcus aureus* in the Infill Media of Synthetic Turf. *Acta Horticulture*. 783:567-572. <http://cropsoil.psu.edu/ssrc/research/microbial>

“Outbreaks of antibiotic-resistant strains of staph last year gained significant media attention, resulting in the temporary closing of school buildings and athletic facilities. Our research found that infilled synthetic turf systems do not harbor significant populations of staph bacteria to warrant concern.”

*Dr. Andrew McNitt, Associate Professor of Soil Science at Penn State University, June 2007, ‘A Survey of Microbial Populations in Infilled Synthetic Turf Fields’*



## MRSA/StaPh

The California EPA's Office of Environmental Health Hazard Assessment conducted a review of available literature entitled, Chemicals and Particulates in the Air Above the New Generation of Artificial Turf Playing Fields, and Artificial Turf as a Risk Factor for Infection by Methicillin-Resistant Staphylococcus Aureus (MRSA). The review concluded that "there is a negligible human health risk from inhaling the air above synthetic turf and it is unlikely that the new generation of artificial turf is itself a source of MRSA."

*California EPA Office of Environmental Health Hazard Assessment, July 2009, 'Chemicals and Particulates in the Air Above the New Generation of Artificial Turf Playing Fields, and Artificial Turf as a Risk Factor for Infection by Methicillin-Resistant Staphylococcus Aureus (MRSA)'*

"This confirms what we thought all along," Cole said. "The speed with which we obtained the results is a testament to how clean things are there."

*Allegheny County Health Department, October 2007*

"There is no data to suggest that turf will ever spread MRSA. We sampled the turf for the Rams' investigation and didn't find it. We actually observed the game. We mapped where the contact on the turf occurred. We sampled those areas where the players were tackled. And then we sampled areas where there wasn't any direct contact to the turf. We didn't find any Staph or MRSA."

*Jeff Hageman, Centers for Disease Control, May 2006*

'there is  
no connection  
between current  
generation synthetic  
surfaces and MRSA  
infections'

"In the outbreaks of MRSA, the environment has not played a significant role in the transmission of MRSA. MRSA is transmitted most frequently by direct skin-to-skin contact. You can protect yourself from infections by practicing good hygiene (e.g., keeping your hands clean by washing with soap and water or using an alcohol-based hand rub and showering after working out); covering any open skin area such as abrasions or cuts with a clean dry bandage; avoiding sharing personal items such as towels or razors; using a barrier (e.g., clothing or a towel) between your skin and shared equipment; and wiping surfaces of equipment before and after use."

*Centers for Disease Control, February 2005*

"We have an injury reporting tracking system and it's limited by sample size, but we haven't had any linkage to turf," said the NCAA's David Klossner. "I know there have been some reports in the media. The CDC continues to tell us that the turf is not a harbor for this MRSA/staph infection. And if things are handled appropriately as far as hygiene practices, common sense, and wound cleaning and coverage, then a lot of these things can be prevented."

*NCAA Director of Health and Safety, David Klossner, November 2006*

"MRSA infection has never been reported in connection with the synthetic surface at Maple Park or similar field designs. Several studies have proven that there is no connection between current generation synthetic surfaces and MRSA infections."

*Ridgewood Environmental Advisory Committee (REAC) January-October 2009, 'Assessment of Environmental, Health and Human Safety Concerns Related to the Synthetic Turf Surface at Maple Park in Ridgewood, NJ'*



hEat  
oVERVIEW

In most climates, heat on synthetic turf fields is not an issue. But on a hot summer day, things outside can get hot.

Dr. Andy McNitt, head of the Penn State Center for Sports Surface Research, advises trainers to be aware of the heat when practicing in the summer on clear days. He recommends cutting down on practice times, considering pulling players off fields earlier and taking more breaks to cool down.

Collected data indicated that the air temperature as measured at a distance of two feet above the synthetic turf surface ranged from one to five degrees greater than the observed ambient air temperature, while the temperature at the same height above the natural turf ranged from 3° F lower to 1° F greater than the ambient air temperature. The measured air temperature at a height of five feet above the synthetic turf more closely approximated the ambient air temperature. Measured air temperatures ranged from 2° F lower to 2° F greater than the ambient air temperature.

Time of day (hrs)	Ambient Temperature	Natural Grass		Synthetic Turf	
		Air Temperature 2 feet above surface	Air Temperature 5 feet above surface	Air Temperature 2 feet above surface	Air Temperature 5 feet above surface
	° F	° F	° F	° F	° F
12:00	101	99	101	103	101
12:30	101	99.7	101	104	101
13:00	103	100	103	104	101
13:30	102	101	102	103	101
14:00	101	100	101	103	101
14:30	99	97	99	104	101
15:00	99	100	99	104	101

“The results of the temperature measurements obtained from the fields studied in Connecticut indicate that solar heating of the materials used in the construction of synthetic turf playing surfaces does occur and is most pronounced in the polyethylene and polypropylene fibers used to replicate natural grass, rather than the crumb rubber particles. Rapid cooling of the fibers was noted if the sunlight was interrupted or filtered by clouds. Significant cooling was also noted if water was applied to the synthetic fibers in quantities as low as one ounce per square foot. The elevated temperatures noted for the fibers generally resulted in an air temperature increase of less than five degrees even during periods of calm to low winds.”

*Milone & MacBroom, engineering, landscape architecture, and environmental science firm based in Connecticut*

‘measured air temperatures ranged from 2° F lower to 2° F greater than the ambient air temperature’

## hEat oVERVIEW

"The study entitled 'Incidence, Mechanisms, and Severity of Game-Related College Football Injuries on FieldTurf versus Natural Grass - A Three Year Prospective Study', shows that there were double the amount of heat-related illnesses on natural grass playing surfaces compared with FieldTurf artificial turf fields."

*Michael C. Meyers, PhD, FACSM, Department of Health and Human Development Montana State University*

"The ambient air above both surfaces differed by only 3°F at 12" above the surface and approximately 2°F at 39" (the approximate chest height of a typical youth athlete). The differences in the ambient air were undetectable without a thermometer. In both cases, the ambient air temperature above the surfaces was slightly higher than the general air temperature."

*Ridgewood Environmental Advisory Committee (REAC) January-October 2009, 'Assessment of Environmental, Health and Human Safety Concerns Related to the Synthetic Turf Surface at Maple Park in Ridgewood, NJ'*



'there were double the amount of heat-related illnesses on natural grass playing surfaces compared with FieldTurf artificial turf fields'

In April 2008, some synthetic turf fields in New Jersey were shut down by the New Jersey Department of Health and Senior Services for elevated levels of lead. However, test results have since indicated there was no lead in the air, soil or in the dust created by the removal of one of the fields.

Both fields were subsequently re-opened.

Lead chromate is not lead carbonate, the lead formerly found in paint. This inorganic substance is used to color the synthetic turf fiber. In synthetic turf, the silica-coated, encapsulated pigment particles are used to improve performance characteristics and reduce toxicity. Bioavailability of lead from pigment is extremely low. It is almost completely insoluble, not an inhalation hazard and not readily absorbed by the body if ingested.



"In July 2008, a U.S. Product Safety Commission staff report concluded that synthetic turf fields are OK to install and play on for people of all ages. The evaluation of older and newer synthetic turf fields concluded that 'young children are not at risk from exposure to lead in these fields.' The report showed that newer fields had no lead or generally had the lowest lead levels. Although small amounts of lead were detected on the surface of some older fields, none of the tested fields released amounts of lead that would be harmful to children."

*U.S. Consumer Product Safety Commission, July 2008, "CPSC Staff Finds Synthetic Turf Fields OK to Install, OK to Play On"*

"Testing on FieldTurf fields have consistently shown 10-20 ppms or less than 5% of the lead level regarded as problematic. No cases of elevated blood lead levels in children have been linked to artificial turf on athletic fields in New Jersey and elsewhere."

*Center for Disease Control (CDC), June 2008, "Potential Exposure to Lead in Artificial Turf: Public Health Issues, Actions, and Recommendations"*

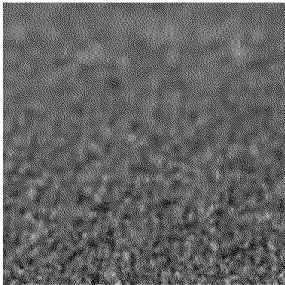
"Based on existing HUD Guidelines and EPA standards, lead hazard risk assessments at these four DPR synthetic turf fields did not identify lead hazards."

*New York City Department of Health and Mental Hygiene, January 2008*



"Lead chromate levels are well below that necessary to cause harm to children and athletes using the popular playing field surfaces. No acute health risks due to use of artificial turf fields, and risks due to chronic and repeated exposure are unlikely."

*New Jersey Department of Health and Senior Services (NJDHSS), April 2008*



"A sample of stormwater was collected from the drainage system of two fields on April 28, 2008, and July 24, 2008, respectively. The results showed that lead was not detected in the drainage from either field."

*Milone & MacBroom, engineering, landscape architecture, and environmental science firm based in Connecticut, December 2008, 'Evaluation of the Environmental Effects of Synthetic Turf Athletic Fields'*

"Because the lead chromate is encapsulated in the fibers, it is presumed not to be bioavailable (is not released through contact) and cannot be absorbed by humans or other living systems. Research shows that contact with, or incidental ingestion of, the fibers or rubber infill poses no health risk."

*Ridgewood Environmental Advisory Committee (REAC) January-October 2009, 'Assessment of Environmental, Health and Human Safety Concerns Related to the Synthetic Turf Surface at Maple Park in Ridgewood, NJ'*

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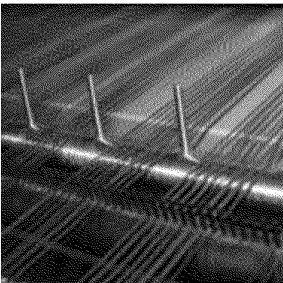
## What the ExPERTS SaY

"The lead levels that were discovered are isolated to the core samples of the turf, and did not appear in the samples of dust, wipes and blades of artificial grass taken from the field - in other words, the lead is encapsulated in the fibers inside the turf and not leaching out to the surface to be ingested."

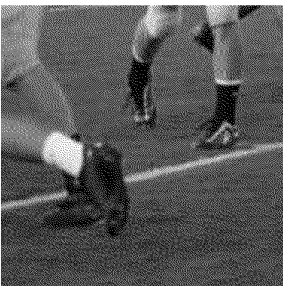
*Patrick Guilmette – PMT Group; premier environmental and consulting engineering firm in NY, NJ, CT, PA*

"If a green synthetic turf field containing lead chromate is still green, then the lead chromate is still in the yarn. If the Yellow Chromate had leached out, the field would likely be blue. Lead chromate is stable when encapsulated in the fiber into which it is extruded. Being encapsulated in the fiber, the lead in the lead chromate is not readily bio-available - meaning that even if the yarn breaks down, the lead in the complex compound which is lead chromate is not readily absorbed by the body."

*Dr. Davis Lee, Ph.D, Synthetic Organic Chemistry, Executive in Residence at the Georgia Institute of Technology School of Polymer, Textile, and Fiber Engineering, April 2008*



"In interpreting the health risk from these results, it is important to recognize that people do not ingest the actual turf fibers. The NJ and EPA soil standards of 400 mg/kg are based on an assumption that small children may ingest approximately 100 mg of soil per day through hand to mouth activity. Thus, comparing the concentration of lead in the turf fiber to an acceptable soil lead concentration is not an accurate way to evaluate the human health risk from exposure to lead in turf fibers and is likely to overestimate risk, because the turf fiber is unlikely to be ingested (if at all) to the same extent as lead in soil."



The best way to evaluate exposure to lead on synthetic turf fields is to evaluate the dust present on the surface of the field. When people play on the field, they may get dust onto their hands or other exposed skin, and transfer the dust into their mouth through normal hand to mouth activity. Thus, the primary route of exposure we are concerned with is ingestion of dust. Lead has no appreciable absorption through the skin, and the inhalation of dust from the field is expected to be minimal, as any dust is likely to adhere to the turf fiber or rubber crumb padding rather than becoming airborne."

*Toxicologist Dr. Barbara D. Beck, a lecturer in Toxicology at Harvard; Former Chief of Air Toxics Staff in Region I EPA; Fellow, Interdisciplinary Programs in Health at the Harvard School of Public Health, May 2008*

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## ConCIUSIon

Concern for a safe and healthy environment is always of paramount importance. Going Green. Eco-friendly. Environmentally safe. These are common phrases heard over and over as we push for a clean, sustainable future.

The recent spate of media coverage concerning artificial/synthetic turf is more hype than fact. It is important to first get the truth from the science.

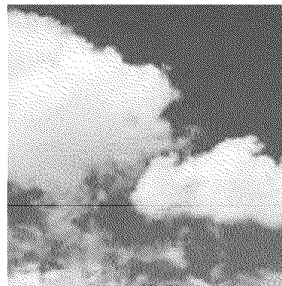
We are not aware of an injury or sickness diagnosed as a result of inhalation, ingestion, or of exposure to any of the components in the FieldTurf system.

Research and testing has been and continues to confirm that properly manufactured synthetic turf surfaces are a safe and sizeable contributor to an eco-friendly lifestyle.

Many countries have commissioned extensive studies to identify any potential dangers of crumb rubber (SBR). Throughout the years such research and testing has been carried out by world health associations, national health departments, municipal and federal groups, sporting associations, environmental protection groups, government ministries and official bodies.

These studies originated mostly in countries where environmental issues are of paramount importance. When the potential dangers were first presented, some countries even prohibited the use of SBR rubber in artificial grass fields. To our knowledge, the countries that originally restricted or prohibited the use of SBR have reversed their position since reviewing the data and results of the comprehensive studies they instituted.

**The ReSeARch hAS BeeN doNe. The STUdleS exIST. GeT The  
fAcTs AND fINd oUT foR yoURSeIf.**



# Synthetic Turf Safety Proven With Science

## Information

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